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FILE 'CAPLUS' ENTERED AT 17:23:33 ON 02 MAY 2000

L1 3 S (ALUMINUM(5N) COPPER (5N) TITANIUM (5N) ALLOY AND INTERCONNEC  
L2 11 S (ALUMINUM(5N) COPPER (5N) TITANIUM (5N) ALLOY AND INTERCONNEC  
L3 8 S L2 NOT L1  
L4 166 S (AL-TI-CU OR AL-CU-TI AND INTERCONNECT?)  
L5 12627 S INTERCONNECT?/TI OR INTERCONNECT?/ST OR INTERCONNECT?/IT  
L6 15 S L4 AND L5  
L7 13 S L6 NOT L2  
L8 15 S (AL-TI-CU OR AL-CU-TI)/TI,ST,IT  
L9 8 S L8 AND L4

FILE 'LCA' ENTERED AT 18:14:49 ON 02 MAY 2000

FILE 'LREGISTRY' ENTERED AT 18:15:09 ON 02 MAY 2000

L10 0 S AL.CU.TI/MF OR AL.TI.CU/MF  
L11 89 S AL(S)CU(S)TI  
L12 89 S L0 OR L11

FILE 'REGISTRY' ENTERED AT 18:18:21 ON 02 MAY 2000

L13 10069 S L12  
L14 260 S L10  
L15 10082 S L13 OR L14

FILE 'CAPLUS' ENTERED AT 18:19:54 ON 02 MAY 2000

L16 44966 S L15  
L17 26566 S INTERCONN?  
L18 97 S L16 AND L17  
L19 632349 S 76/CC  
L20 23 S L18 AND L19

FILE 'REGISTRY' ENTERED AT 18:30:38 ON 02 MAY 2000

L21 1 S 54727-38-7

*(no additional references)*

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FILE 'REGISTRY' ENTERED AT 06:21:00 ON 02 MAY 2000

L1 4691 S ALUMINUM ALLOY(S)BASE(S) AL(S) CU (S)TI

FILE 'CAPLUS' ENTERED AT 06:21:05 ON 02 MAY 2000

L2 632349 S 76/CC

FILE 'REGISTRY' ENTERED AT 06:24:29 ON 02 MAY 2000

L4 9250 S (0-2 CU AND 0-1 TI)/MAC

L5 3139 S L1 AND L4

FILE 'CAPLUS' ENTERED AT 06:25:46 ON 02 MAY 2000

L6 24266 S L5

L8 122 S L6 AND L2

E H01L023/IC

L11 10695 S E3

L12 26 S L6 AND L11

L16 26562 INTERCONNECT?

L17 44 L6 AND L16 26

L18 7 L2 AND L17 3-5,7

FILE 'REGISTRY' ENTERED AT 14:46:56 ON 02 MAY 2000

L1 1 S 123901-27-9 Ref 10

FILE 'CAPLUS' ENTERED AT 14:51:33 ON 02 MAY 2000

L2 12 S L1

FILE 'REGISTRY' ENTERED AT 15:31:38 ON 02 MAY 2000

L3 1 S 136331-09-4 /RN ref 1

L3 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2000 ACS  
 RN 136331-09-4 REGISTRY  
 CN Aluminum alloy, base, Al 98,Si 1,Cu 0.5,Ti 0.2 (9CI) (CA INDEX NAME)  
 OTHER CA INDEX NAMES:  
 CN Silicon alloy, nonbase, Al 98,Si 1,Cu 0.5,Ti 0.2  
 MF Al . Cu . Si . Ti  
 CI AYS  
 SR CA  
 LC STN Files: CA, CAPLUS, USPATFULL

Component	Component Percent	Component Registry Number
Al	98	7429-90-5
Si	1	7440-21-3
Cu	0.5	7440-50-8
Ti	0.2	7440-32-6

# 1 REFERENCES IN FILE CA (1967 TO DATE)

## REFERENCE 1

AN 115:172376 CA  
 TI Aluminum alloy containing copper, silicon, and titanium for VLSI  
 (very-large-scale-integration) devices  
 IN Lowrey, Tyler A.; Doan, Trung T.  
 PA Micron Technology, Inc., USA  
 SO U.S., 11 pp.  
 CODEN: USXXAM  
 DT Patent  
 LA English  
 IC ICM H01L023-48  
 ICS B32B015-04  
 NCL 420529000  
 CC 76-2 (Electric Phenomena)  
 Section cross-reference(s): 56

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 4999160	A	19910312	US 1989-445969	19891204

AB An improved Al alloy, from which interconnect lines of VLSI circuit devices may be fabricated, comprises Al, Cu, Ti, and Si, and is not only resistant to electromigration and stress cracking, but produces Si ppt. crystals which are much finer than those produced by Al-Cu-Si alloys under the hot-and-cold temp. cycling that is required by contemporary semiconductor fabrication processes. These fine Si ppt. crystals are much less likely to destroy the elec. continuity of an alloy-to-Si junctions within an integrated-circuit device, even where dimensions of such junctions have been reduced. Although other alloy proportions are usable, optimal alloy percentages are detd. to be 0.5-3 wt.% Cu and 0.05-1 wt.% Ti, the wt.% of Si being detd. by the satn. concn. of the alloy at the max. process temp. (generally within 0.5 to 2 %).

IT 136331-09-4  
 RL: USES (Uses)  
 (interconnection, for very-large-scale integrated circuit)

L1 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2000 ACS  
 RN 123901-27-9 REGISTRY  
 CN Aluminum alloy, base, Al 100,Ti 0.2,Cu 0.1 (9CI) (CA INDEX NAME)  
 MF Al . Cu . Ti  
 CI AYS  
 SR CA  
 LC STN Files: CA, CAPLUS

Component	Component Percent	Component Registry Number
Al	100	7429-90-5
Ti	0.2	7440-32-6
Cu	0.1	7440-50-8

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L18 ANSWER 3 OF 7 CAPLUS COPYRIGHT 2000 ACS

AN 1993:615338 CAPLUS

DN 119:215338

TI Preparation of aluminum-copper alloy interconnections in  
 manufacture of semiconductor devices

IN Ito, Takahiro

PA Fujitsu Ltd, Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01L021-3205

ICS H01L021-28; H01L021-302

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 05041380	A2	19930219	JP 1991-196246	19910806
AB	Manuf. of a semiconductor device, in which an Al-Cu alloy is sputter-deposited to fill contact holes in an insulator film formed on a substrate, and the planar Al-Cu-alloy layer is etched to form an interconnection , includes (a) deposition of Al (or its alloy) on the Al-Cu-alloy layer to form a protective film; (b) forming a resist layer on the protective film, and selectively removing it by reactive-ion etching using O (or its mixt.) to create a resist pattern; and (c) etching the protective film and the Al-Cu-alloy layer with reactive ions using the resist pattern as a mask to form an interconnection . The method does not produce residual Al.				
IT	7429-90-5, Aluminum, uses		11100-88-2 11145-30-5	123901-27-9	
	137849-52-6				
RL:	USES (Uses)				
	(protective films from, in prepn. of aluminum-copper-alloy interconnections for semiconductor devices)				

L18 ANSWER 4 OF 7 CAPLUS COPYRIGHT 2000 ACS

AN 1992:460603 CAPLUS

DN 117:60603

TI Semiconductor device

IN Hosoda, Tsutomu

PA Fujitsu Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 6 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01L021-3205

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 04035035	A2	19920205	JP 1990-142352	19900531
JP 2900522	B2	19990602		

AB A semiconductor device comprises a migration-resistant metal interconnection layer comprising a Ta layer and an Al-based alloy layer contg. Cu and Ti. Addnl., the interconnection layer may have a barrier of Ti and TiN layers.

IT 123901-27-9

RL: TEM (Technical or engineered material use); USES (Uses)  
( interconnections from tantalum and, for integrated circuits)

L18 ANSWER 5 OF 7 CAPLUS COPYRIGHT 2000 ACS

AN 1992:97417 CAPLUS

DN 116:97417

TI Preparation of interconnections in manufacture of semiconductor devices

IN Kojima, Hideyuki

PA Fujitsu Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01L021-3205

ICS H01L021-90

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 03245532	A2	19911101	JP 1990-43471	19900223
JP 2893800	B2	19990524		

AB Manuf. of a semiconductor device includes the steps of: (a) forming a refractory-metal 1st interconnection on an insulator-covered substrate; (b) forming an interlayer insulator film on the substrate, which has a through-hole exposing the interconnection ; (c) successively depositing a TiN film, or a barrier layer from a Ti bottom film and a TiN top film, and a Si-free Al-alloy film on the insulator film; and (d) patterning the deposited films to form a 2nd interconnection connected with the 1st interconnection . The 2nd interconnection has increased resistance against stress and electromigration.

IT 7440-33-7P, Tungsten, uses 123901-27-9P

RL: PREP (Preparation); USES (Uses)  
( interconnections from, prepn. of, in manuf. of semiconductor

devices)

L18 ANSWER 7 OF 7 CAPLUS COPYRIGHT 2000 ACS

AN 1989:645344 CAPLUS

DN 111:245344

TI Effects of copper and titanium addition to aluminum interconnects  
on electro- and stress-migration open circuit failures

AU Hosoda, Tsutomu; Yagi, Haruyoshi; Tsuchikawa, Haruo

CS Process Dev. Div., Fujitsu Ltd., Kawasaki, 211, Japan

SO Annu. Proc., Reliab. Phys. [Symp.] (1989), 27th, 202-6

CODEN: ARLPBI; ISSN: 0099-9512

DT Journal

LA English

AB Electromigration (EM) lifetimes are detd. for pure Al, Al-0.1 wt.% Cu, Al-0.15 wt.% Ti, and Al-0.1 wt.% Cu-0.15 wt.% Ti as a function of the line width. The addn. of 0.15 wt.% Ti improves the EM resistance, in which the lifetime increases with decreasing line width. The lifetimes of Al-0.1 wt.% Cu are similar to pure Al. The stress-migration (SM) open failure are also evaluated. The Ti addn. has a deteriorating effect on SM. The Cu addn., however, substantially improves the SM resistance. The simultaneous addn. of Cu and Ti improves both EM and SM resistances.

IT 12616-96-5 12670-32-5 123901-27-9

RL: USES (Uses)

(interconnections , stress related failure and reliability of)

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AN 116:267127 CA

TI Semiconductor device having laminated aluminum titanium alloy layer

IN Yagi, Haruyoshi

PA Fujitsu Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 4 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

IC ICM H01L021-3205

CC 76-3 (Electric Phenomena)

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI JP 04017338	A2	19920122	JP 1990-120691	19900510
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AB The device consists of a substrate coated with an AlTi alloy layer and an AlCuTi alloy layer. The device showed good stress-migration and electromigration resistance.

IT 123901-27-9

RL: USES (Uses)

(semiconductor device contg., laminated with aluminum titanium layer)